Section II. (REMARKS)

The pending claims in the application are 15-37.

Amendment to Claim 15

Claim 15 has been amended herein to include the limitation of claim 35. Claim 36 has been correspondingly amended.

No new matter has been added herein.

Provisional Double Patenting Rejection Under the Judicially Created Doctrine of Obviousness-Type Double Patenting

In the May 11, 2006 Office Action, the Examiner provisionally rejected claims 15-17 and 20-23 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 49-64 of copending U.S. Patent Application No. 10/602,172.

When the obviousness-type double patenting rejection is the only rejection remaining to the presently pending case AND **if** the presently pending claims are an obvious variation of the invention defined in claims 49-64 of co-pending U.S. Patent Application No. 10/602,172 (which can only be objectively assessed when the only rejection remaining in the presently pending case is the obviousness-type double patenting rejection), applicants will consider submitting the required terminal disclaimer.

Rejection of Claims and Traversal Thereof

In the May 11, 2006 Office Action:

claim 36 was rejected under 35 U.S.C. §112, first paragraph;

claims 15-23, 25-27, and 30 were rejected under 35 U.S.C. §102(e) as being anticipated by Sehgal (U.S. Patent Application Publication No. 2004/0050406A1);

claims 24 and 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of De Young et al. (U.S. Patent No. 6,669,785);

claims 31-34, were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of Xu et al. (U.S. Patent Application Publication No. 2003/0125225); and

claim 36 was rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of Hess et al. (U.S. Patent No. 6,627,588); and

claims 15-17 and 20-23 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting over claims 49-64 of copending Application No. 10/602,172 (U.S. Patent Application Publication No. 2004/0266635 A1 in the name of Michael Korzenski et al.).

These rejections are traversed and reconsideration of the patentability of the pending claims is requested in light of the following remarks.

Rejection under 35 U.S.C. §112, first paragraph

In the May 11, 2006 Office Action, claim 36 was rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. Specifically, the Examiner indicated that the claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the applicants, at the time the application was filed, had possession of the claimed invention. Applicants vigorously disagree.

Applicants' composition, amongst other things, is useful for removing ion implanted photoresist layers from a substrate having same thereon (see, e.g., instant specification, paragraph [0016] and [0030]). Accordingly, when applicants' composition comprising at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant is used according to the process of claim 36, the composition will thereafter further include ion implanted photoresist material. If the composition includes ion implanted photoresist material, the composition will inherently include at least one implanted ion.

The Examiner is respectfully reminded that to satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time of filing. MPEP §2163 (I) (citing *Vas-Cath, Inc. v. Mahurkar*, 19 U.S.P.Q.2d 1111, 1116 (Fed. Cir. 1991)).

In the present case, one skilled in the art considering applicants' presently pending application, aptly entitled "COMPOSITION USEFUL FOR REMOVAL OF BOTTOM ANTI-REFLECTION COATINGS FROM PATTERNED ION-IMPLANTED PHOTORESIST WAFERS," would reasonably conclude that there would be a moment in time following the initiation of the process of claim 36 that the composition would include at least one implanted ion.

Accordingly, withdrawal of the rejection of claim 36 under §112, first paragraph, is respectfully requested.

Rejection under 35 U.S.C. §102(e)

In the May 11, 2006 Office Action, claims 15-23, 25-27 and 30 were rejected under 35 U.S.C. §102(e) as being anticipated by Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) (hereinafter Sehgal). Applicants traverse such rejection.

Applicants have amended claim 15 to recite:

> **"A method of removing a bottom anti-reflection coating (BARC) layer from a substrate having same thereon, said method comprising contacting the substrate having the BARC layer thereon with an SCF-based removal composition comprising at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant, for sufficient time and under sufficient contacting conditions to at least partially remove the BARC layer from the substrate, wherein the contacting conditions comprise temperature in a range of from about 50°C to about 90°C."** (emphasis showing claim amendment(s))

It can be seen that claim 15 has been amended to include the limitation of previously pending claim 35, i.e., the contacting conditions comprise temperature in a range from about 50°C to about 90°C, which according to the May 11, 2006 Office Action, is impliedly novel over Sehgal.

Accordingly, applicants respectfully request withdrawal of the rejection of pending claims 15-23, 25-27 and 30 under §102(e) over Sehgal.

Rejections under 35 U.S.C. §103(a)

1. In the May 11, 2006 Office Action, claims 24 and 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of De Young et al. (U.S. Patent No. 6,669,785) (hereinafter De Young). Applicants traverse such rejection.

Sehgal relates to a single-step method using supercritical fluids to remove resist and/or resist residue and to dry the substrates, which according to Sehgal provides a distinct advantage over prior art methods requiring follow-on cleaning and/or drying steps (see Sehgal, paragraph [0013]). For example, Sehgal recites:

- "It is highly desirable to expedite and thereby reduce the cost of the resist removal process by eliminating the need for follow-on cleaning and/or drying steps. It would be desirable to carry out the resist and/or resist residue removal and drying of the wafer in one step at low temperature." (see paragraph [0009]) (emphasis added)
- "Removing resist and/or resist residue, and drying of the wafer in one step at low temperature is possible using the compositions and methods disclosed herein for supercritical processing." (see paragraph [0010]) (emphasis added)
- "Using the disclosed compositions/methods of scCO.sub.2 cleaning, one can remove very high implant levels photoresist (8×10^{15} atoms/cm^2) and come out with a dry, photoresist free wafer surface in a single step that is less harsh on the environment and the substrate itself than the multi-step processes currently used in the industry." (see paragraph [0071]) (emphasis added)

In contrast, the method disclosed in De Young is as follows:

"A specific embodiment of the foregoing methods may be

carried out by:

(a) providing-a first (optionally but preferably nonaqueous) cleaning fluid, the first cleaning fluid comprising a single phase solution of an amine and a semi-polar to polar cosolvent in carbon dioxide;

(b) providing a second cleaning fluid, the second cleaning fluid comprising an adduct of hydrogen fluoride with a Lewis base in carbon dioxide;

(c) cleaning the substrate by contacting the substrate to the second cleaning fluid for a time sufficient to clean the substrate; and

(d) cleaning the substrate before, after, or both before and after the cleaning step (c) by contacting the substrate to the first cleaning fluid for a time sufficient to facilitate the cleaning of the substrate." (see De Young, col. 2, line 55 through col. 3, line 4)

Comparing the teaching of Sehgal with that of De Young, it can be seen that Sehgal expressly relates to a single-step process and the elimination of follow-on cleaning steps, said single step being "less harsh on the environment and the substrate itself than the multi-step processes currently used in the industry." In contrast, De Young teaches a specific two-step cleaning process using two different cleaning solutions.

Considering Sehgal and De Young as a whole, as the Examiner must do,[1] applicants question should the process used upon combination be the one-step process of Sehgal or the two-step process of De Young? Importantly, neither reference provides any motivation, teaching or suggestion as to whether upon combination the process should be a one-step or two-step process, which evidences that there is no motivation, teaching or suggestion to combine the references at all.

Importantly, the Examiner is not allowed to cherry pick the disclosure of De Young to extract the triethylamine trihydrofluoride teaching while simultaneously ignoring that De Young relates to a two-step process using two different cleaning compositions. The foregoing compels the conclusion that the rejection is based solely on hindsight, which is impermissible. The courts have made it clear that an Examiner must not use an applicant's own disclosure as a blueprint to

[1] It is well established as a matter of law that prior art references must be considered as a whole. *W.L. Gore & Associates, Inc., v. Garlock, Inc.*, 220 U.S.P.Q. 303 (Fed. Cir. 1993), *cert. denied*, 469 U.S. 851 (1984).

arbitrarily piece together isolated features described in the references (where no teaching or suggestion to combine the references is present) in an attempt to re-create applicant's claimed invention.

Furthermore, it is well established that if the combination of Sehgal and De Young renders either reference unsatisfactory for its intended purpose, a *prima facie* case of obviousness does not exist. See, *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

For example, the intended purpose of Sehgal is a one-step process and the elimination of additional cleaning steps. Upon the combination of Sehgal with De Young, as proposed by the Examiner, a second cleaning step should logically be introduced – after all, the Examiner is not allowed to pick and choose some elements of the Sehgal teaching while ignoring others. Clearly, the introduction of a second cleaning step defeats the intended purpose of Sehgal. Further, upon combination of Sehgal and De Young, should the required components of Sehgal, specifically the oxidizer and the carbonate species, be introduced to the first or the second De Young cleaning solution? None of these questions have clear answers, which compels the conclusion that there is no motivation, teaching or suggestion to combine Sehgal and De Young.

In conclusion, there is no motivation, teaching or suggestion to combine Sehgal and De Young and the combination renders Sehgal unsatisfactory for its intended purpose. Accordingly, applicants request withdrawal of the rejection of claims 24 and 28-30 under §103 as being unpatentable over Sehgal in view of De Young.

2. In the May 11, 2006 Office Action, claims 31-34, were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of Xu et al. (U.S. Patent Application Publication No. 2003/0125225) (hereinafter Xu). Applicants traverse such rejection.

According to the Examiner, Sehgal fails to teach the repetitive carrying out of the dynamic flow contacting and static soaking contacting of the substrate to be cleaned (see May 11, 2006 Office Action, page 5, lines 7-9). However, Xu teaches a "cleaning/removal process of unwanted residue including unexposed photoresist using supercritical fluid composition as claimed including the steps of contacting the fluid to the substrate by flowing and repeated cycles of soaking to achieve substantially complete removal of the unwanted materials from the substrate"

(see May 11, 2006 Office Action, page 5, lines 10-14) (citing Xu, paragraphs [0059]-[0061]).

Specifically, the portion of Xu that the Examiner cited states, *inter alia*:

> "If necessary, repeated cycles of soaking and **decompression** may be utilized to achieve substantially complete removal of the unwanted material from the semiconductor wafer." (emphasis added)

In other words, Xu expressly teaches, and the Examiner specifically cited, a cycling process including a pressure change.

Considering Sehgal as a whole, as the Examiner must do, it can be seen that Sehgal expressly recites in paragraph [0135] that the cleaning process is carried out without pressure cycling:

> "It is significant to note that, as with the cleaning in all of the examples of this application, the cleaning in this example was carried out at a single operating pressure **without** any pressure cycling. Several known processes use pressure cycling to remove photoresist and etch residue from wafer surfaces under $scCO_2$ conditions. In these processes, pressure cycling is needed because the processes use solutions that undercut the photoresist and lift it off the substrate. The undercut photoresist needs to be moved off the wafer surface and dissolved into the co-solvent mixture and/or captured in a filter. These known processes achieve this by recirculating the $scCO_2$ and co-solvent mixture at a high rate in a process loop, and partially and fully exhausting the high pressure chamber. In contrast, the embodiments described herein utilize co-solvent mixtures that dissolve the photoresist and etch residue into the co-solvent 1 mixture, thus **avoiding the need for wasteful pressure cycling**." (emphasis added)

In other words, Sehgal expressly teaches away from the combination of Sehgal and Xu, as proposed by the Examiner – the process of Sehgal is expressly intended to be carried out without pressure cycling.[2]

It is well established that it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983).

[2] This is further evidenced by the disclosure in Sehgal at paragraphs [0024] and [0042].

Furthermore, Sehgal teaches away from applicants' pressure cycling claims. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) (emphasis added).

In conclusion, because Sehgal teaches away from Xu and applicants' claimed invention, the Examiner has failed to establish a *prima facie* case of obviousness of claims 31-34 in view of Sehgal and Xu. Accordingly, applicants respectfully request withdrawal of the rejection under §103.

3. In the May 11, 2006 Office Action, claim 36 was rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of Hess et al. (U.S. Patent No. 6,627,588) (hereinafter Hess). Applicants traverse such rejection.

According to the Examiner, Sehgal fails to teach that the removal process involves the removal of ion implanted photoresist. In addition, as a result of the amendment to claim 36, Sehgal also does not teach that the contacting conditions comprise temperature in a range of from about 50°C to about 90°C.

Hess relates to a liquid cleaning composition including an aliphatic alcohol and a method for the removal of photoresist using said composition. Importantly, the Hess method includes temperature in a range from about 25°C to about 70°C and pressure in a range from about 14 psi to about 100 psi, but up to 500 psi is disclosed.

It is well known in the art that the critical temperature and pressure for carbon dioxide are 31°C and 72.8 atmospheres, respectively. Only at temperatures AND pressures greater than those of the critical point is carbon dioxide in the supercritical phase.

Assuming that Hess disclosed the use of a carbon dioxide solvent, which it does not, the maximum pressure disclosed in Hess is 500 psi, which corresponds to only 34 atmospheres. Accordingly, Hess does not motivate, teach or suggest conditions necessary for the supercritical CO_2 phase.

That said, Hess does relate to an isopropyl alcohol (IPA) composition and thus it is important to

determine if the temperature and pressure disclosed in Hess would motivate, teach or suggest a supercritical IPA phase. The critical temperature and pressure of IPA are 235.2°C and 691 psi,[3] respectively, well below the parameters disclosed in Hess and as such, the IPA composition of Hess is not intended to be supercritical.

As previously discussed, Sehgal does not teach each and every limitation of claim 15, including the contacting conditions comprising temperature in a range of from about 50°C to about 90°C. Hess does not cure this deficiency.

Hess does not relate in any way to a supercritical system. As such, to import the temperature of Hess into the supercritical Sehgal teaching would be improper. As such, the combination of Sehgal and Hess does not motivate, teach or suggest every limitation of applicants' claim 15, including at least one supercritical fluid. Accordingly, a mandatory requirement needed to establish a *prima facie* case of obviousness has not been met. See, *In re Royka*, 180 USPQ 580 (CCPA 1974). Withdrawal of the rejection of claim 36 as being obvious in view of Sehgal and Hess is respectfully requested.

Fees Payable

One (1) dependent claim has been added herein. As such, an added claims fee of (1 × $50.00) = $50.00 is due.

The total fee of $50.00 is authorized to be withdrawn from Deposit Account No. 13-4365 of Moore & Van Allen PLLC.

Conclusion

Claims 15-37 are now in form and condition for allowance. Favorable action is hereby requested. Authorization is hereby given to charge any deficiency in applicable fees for this response to Deposit Account No. 13-4365 of Moore & Van Allen PLLC. If any additional issues remain, the Examiner is requested to contact the undersigned attorney at (919) 286-8090 to discuss same.

Respectfully submitted,

[3] zenstoves.net/CHRIS/IPA.pdf

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